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New equations of convolution type obtained by replacing the integral by its maximum

Avkhadiev F., Maklakov D.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We study the nonlinear equation max g(γ)|cos(γ - α)| = f(α), γεℝ where f(α) is a given function and g(γ) is the unknown function, to be found in the class of nonnegative continuous π-periodic functions. This equation arose in the context of an applied problem dealing with the construction of a hydrofoil from given pressure envelopes. Necessary and sufficient conditions for the solvability of the equation, an explicit description of the solution set, and a comparison theorem under changes of the right-hand sides are obtained. Some possible ways of generalization are indicated.

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Keywords

Equations of convolution type, Pressure envelope, Trigonometric convexity